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# CITRUS PROCESSING IN BRAZIL

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## FOREWORD

Brazil's emergence from an insignificant producer of orange juice concentrate to one of the world's major exporters has taken place in just a few years. While many countries have entered the international market for this product, in 1968 Brazil was the world's leading exporter. Future competition will be keen, but sizable increases in orange production and processing are planned, and further gains in the export market are anticipated.

This report covers the development of Brazil's orange-processing industry from the fruit groves through the marketing process. It was prepared by Shackford Pitcher, U.S. Agricultural Officer at the American Consulate General in São Paulo, with assistance from Robert B. Tisch of the Fruit and Vegetable Division, FAS. It is based largely on information gathered in the course of Mr. Pitcher's 3 years in Brazil, supplemented during a trip through the major citrus-producing areas in September 1969 by him and Mr. Tisch. The cooperation received from the many people contacted during this survey is gratefully acknowledged, especially that of Antonio Ambrosio Amaro, Institute of Agricultural Economics, São Paulo Department of Agriculture.

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# Citrus Processing in Brazil

## INTRODUCTION

The fortunes of the Brazilian commercial citrus industry were closely identified with the fresh export market for many decades. In 1963, however, the creation of the first modern export-oriented processing plant added a new and profitable dimension to the industry. This development closely followed the 1962 freeze in Florida, prior to which the United States was by far the most important exporter of orange juice concentrate. Many countries, including Brazil, were encouraged by the high prices following the Florida freeze to establish or expand processing industries. While exports from some countries have declined in recent years as production resumed its upward trend in Florida, the production and exportation of concentrated orange juice in Brazil has moved ahead at an unprecedented rate. The availability of abundant supplies of processing fruit plus the ability to produce a competitive product has catapulted Brazil into the forefront as supplier of orange juice concentrate to the world's markets.

An adequate supply of oranges for the Brazilian processing plants, almost all of which are located in the State of São Paulo, seems assured. Millions of trees have been planted in recent seasons, and nurseries are prepared to supply many more at least over the next 3 years. If yields improve as anticipated, the prospect exists for a very substantial increase in production.

## BRAZIL'S POSITION IN THE INTERNATIONAL MARKET

Brazil's first exports of fresh oranges went to Argentina in the mid-1910's, with exports to Europe following about 10 years later. The orange export market expanded until 1939, when 5.6 million 40-kilo boxes (88.2 lb.) were shipped. Exports dropped severely during World War II, and the 1939 record has never been surpassed. A post-World-War-II high of 4.0 million boxes was shipped in 1965, but exports dropped off again, averaging 2 million boxes between 1966 and 1968. A further decline is expected in 1969 (table 1).

Brazil is a major supplier of oranges to the European market in the summer months when the nearby Mediterranean countries provide practically no competition. Small quantities of grapefruit and lemons also are shipped. During this period, South Africa is the largest exporter, exceeding Brazil's shipments each year by several million boxes. The United States also is a prominent summer supplier to Europe.

Table 1.—BRAZIL: Exports of fresh and processed citrus

Commodity	1966		1967		1968	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Metric tons</i>	<i>US\$1,000</i>	<i>Metric tons</i>	<i>US\$1,000</i>	<i>Metric tons</i>	<i>US\$1,000</i>
Fresh oranges .....	79,341	3,759	89,922	3,455	72,542	3,104
Fresh tangerines .....	3	( <sup>1</sup> )	292	14	7	( <sup>1</sup> )
Fresh grapefruit .....	1,730	62	2,120	95	2,558	97
Fresh lemons and limes .....	---	---	---	---	4	( <sup>1</sup> )
Orange juice .....	13,929	4,737	18,647	6,692	30,096	11,631
Lemon and lime juice .....	---	---	7	2	---	---
Other fruit juices <sup>2</sup> .....	140	54	316	103	( <sup>3</sup> )	( <sup>3</sup> )
Essential oils, citrus .....	34	59	65	120	224	130

<sup>1</sup> Less than \$500.

<sup>2</sup> Includes grapefruit and tangerine juices.

<sup>3</sup> Not available.

Source: CACEX, Bank of Brazil



Brazil's earlier export shipments came mainly from the orange groves located near Rio de Janeiro, but disease problems plus increases in property values forced a decline in citrus production in this area. Over the years, oranges produced in São Paulo became more important in the export market and gained complete control starting in 1962. Today, the State of São Paulo dominates commercial citrus growing in the country and not only accounts for all the exports of fresh oranges but practically all the citrus processing in the country. Citrus is produced throughout Brazil; hence, the domestic market is supplied from local production. Producing zones in other States are attempting to improve their citrus and perhaps will seek export market outlets. Nevertheless, it appears that for the foreseeable future commercial development will take place mainly in São Paulo.

Brazil was the world's largest exporter of orange juice concentrate in 1968 even though success in the world market has been a very recent achievement. Brazilian export data have a single category for all types of orange juice. Based on trade reports, it is believed that about two-thirds of the exports are frozen concentrate and the remainder is hot-pack and preserved concentrate. Orange juice exports jumped from 235 metric tons in 1962 to 5,314 tons in 1963. The following year exports slipped to 3,825 tons, but since then, orange juice exports have expanded greatly, with each successive year establishing new highs. In 1968 Brazil exported a record 30,096 tons valued at \$11.6 million, making orange juice the third most important processed food export commodity, exceeded only by canned beef and soluble coffee. Mainly because of a severe drought and high raw fruit costs, exports in 1969 are expected to approximate only 22,500 tons.

In 1968, 41 percent of Brazil's orange juice exports were shipped to the United States, followed by Canada, West Germany, and the Netherlands (table 2). Combined exports to the United States and Canada during the 6-year period 1963 through 1968 have totaled 50 percent of total exports. However, West Germany was the largest individual market during this period.

Table 2.—BRAZIL: Exports of orange juice

Destination	1963		1964		1965		1966		1967		1968	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Metric tons</i>	<i>US \$1,000</i>	<i>Metric tons</i>	<i>US \$1,000</i>	<i>Metric tons</i>	<i>US \$1,000</i>	<i>Metric tons</i>	<i>US \$1,000</i>	<i>Metric tons</i>	<i>US \$1,000</i>	<i>Metric tons</i>	<i>US \$1,000</i>
United States	735	46	1,880	613	1,318	427	2,040	646	3,403	1,357	12,239	4,574
Australia	---	---	---	---	---	---	---	---	76	38	---	---
Belgium-Lux.	---	---	---	---	5	2	278	111	272	120	5	2
Bolivia	---	---	---	---	---	---	---	---	---	---	( <sup>1</sup> )	( <sup>2</sup> )
Canada	2,406	1,213	1,279	609	825	330	4,102	1,432	2,569	952	6,273	2,733
Denmark	---	---	---	---	50	18	271	113	190	64	345	110
France	---	---	---	---	---	---	---	---	1,001	410	216	96
Germany, West	1,894	806	636	204	3,390	1,056	5,041	1,734	7,169	2,279	5,485	2,009
Israel	40	15	---	---	---	---	589	149	498	219	---	---
Italy	---	---	---	---	---	---	---	---	---	---	38	15
Netherlands	168	60	---	---	44	15	988	349	2,231	795	4,070	1,543
Norway	---	---	---	---	---	---	4	2	187	88	---	---
Spain	---	---	---	---	---	---	---	---	---	---	228	102
Sweden	---	---	---	---	22	9	247	96	281	111	603	246
Switzerland	---	---	---	---	11	4	---	---	---	---	---	---
U.K.	70	26	30	11	95	23	369	105	770	259	594	201
Total	5,313	2,166	3,825	1,437	5,760	1,884	13,929	4,737	18,647	6,692	30,096	11,631

<sup>1</sup> Less than 500 kg.

<sup>2</sup> Less than \$500.

Source: Comercio Exterior do Brasil, Min da Fazenda



In 1968 Brazil was the leading exporter of concentrated orange juice and the United States was second. These two countries supplied more than one-half of the world's orange concentrate exports and a substantially higher portion of the frozen product. Israel is the third major exporter, contributing a vast array of concentrated juices and beverage bases. Brazil is the only major processor that does not currently export single-strength juice.

## GROWING OPERATIONS

### São Paulo producing areas

The major commercial citrus producing centers in São Paulo lie within a belt about 150 miles long and 50 miles wide extending from Campinas to Barretos, with the largest concentration of groves in the vicinity of Bebedouro, Limeira, and Araras (see map). Two important commercial production centers outside of the citrus belt are the Sorocaba and Paraíba Valley districts, both shipping mainly to the local market. About 16 percent of São Paulo's citrus production comes from groves outside the above-mentioned commercial areas.

For several years new citrus plantings in certain areas of western São Paulo were prohibited or restricted because of the citrus-canker eradication program of the State government. During the 9 years of the program's operation, more than 1.1 million citrus trees were pulled out, and government technicians visited more than 250,000 farms and inspected about 7 million trees. In October 1968 the planting restrictions were relaxed in most of the affected areas. Now, new plantings are limited to a small number of trees under strict control in these areas. Citrus canker never spread north of the Tietê River, which divides São Paulo as it runs east to west. Fresh citrus produced in the zones on the south side of the Tietê, including citrus from neighboring states of Paraná and Mato Grosso, cannot be shipped north of the river, where all the processing plants are located.

The growing importance of São Paulo's citrus production, which now looks to processing as a major outlet, comes at a time when many of the other important cash crops have been caught in a severe cost-price squeeze. Some of the citrus plantings have been made on land formerly in coffee, but to a large extent citrus is now being planted on land which was in other crops and pasture. São Paulo has a great deal of land called *campo cerrado*, which has deep but somewhat poor soils. However, citrus appears to be better adapted here than most other crops. Climatic conditions are very favorable for the growing of citrus in most portions of the State.

### Tree numbers and production

The São Paulo Department of Agriculture (SPDA) compiles area and production data on citrus and releases crop forecasts and estimates several times a year. Because of a reorganization of the functions and locations of SPDA field offices, the breakdown by regions in production data currently available differs from the regional breakdown used until mid-1968. Area and production data for 1962 to 1967 with preliminary estimates for 1968 are shown in Table 3, whereas final 1968 and 1969 estimates for the new regions are shown in Table 4. São Paulo is currently producing about 34.8 million boxes of oranges and 5.7 million boxes of tangerines (both 40 kg. or 88.2 lb.) plus about 2.6 million boxes of lemons and limes (27 kg. or 59.5 lb.). For the time being, grapefruit is of minor importance, with the latest trade estimates indicating less than 100,000 grapefruit trees in production.

During the last 4 years a substantial increase in citrus plantings has been reported in São Paulo. Although Table 4, published by the SPDA, indicates only 20 percent of the 32.8 million orange trees in the State are nonbearing, it appears from discussion with various members of the industry that the commercial producing areas contain a higher percentage of nonbearing trees. Orange trees come into commercial production normally by the fourth year after transplanting from the nursery. Of the other types of citrus, 18 percent of the tangerine trees and 26 percent of the lemons and limes are not yet in production, according to the SPDA.

Citrus plantings during 1969 and 1970 are expected to continue at high levels. In the Limeira zone alone there are over 3 million orange trees in nurseries ready for transplanting, with at least 1 million more trees in Bebedouro and over one-half million near Araras. Reports from nurserymen indicate a very good demand for these trees. Most have already been sold, and the nurserymen expect little difficulty selling the remainder. Another 7 million seedlings will be ready for grafting in mid-1970, an indication that the high rate of planting can continue at least through 1970. There is no guarantee that all of these seedlings will be grafted; nevertheless, the material is being prepared, thus assuring a large potential supply.



Table 3.—STATE OF SÃO PAULO: Area and production of oranges

Region	Average 1962-64		1965		1966		1967		1968 <sup>1</sup>	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
	<i>Hectares</i>	<i>1,000 boxes<sup>2</sup></i>	<i>Hectares</i>	<i>1,000 boxes<sup>2</sup></i>	<i>Hectares</i>	<i>1,000 boxes<sup>2</sup></i>	<i>Hectares</i>	<i>1,000 boxes<sup>2</sup></i>	<i>Hectares</i>	<i>1,000 boxes<sup>2</sup></i>
Baurú .....	2,420	953	2,750	1,080	2,595	978	2,619	940	2,415	884
Bebedouro .....	22,490	4,565	28,570	6,600	22,380	5,830	25,490	7,840	28,875	8,327
Campinas .....	13,250	3,941	14,290	3,800	11,900	3,894	14,267	4,960	14,965	4,382
Itapetininga .....	5,530	1,228	5,150	1,290	4,685	1,193	4,414	990	4,040	904
Jaú .....	13,030	2,551	21,430	4,000	15,260	4,440	16,290	4,960	17,495	6,141
Marília .....	1,500	606	1,910	750	1,830	590	1,938	850	2,010	827
Pitacibaca .....	27,590	4,647	25,950	5,700	22,870	5,357	24,167	6,510	24,925	6,565
Ribeirão Preto .....	2,200	683	2,180	680	1,585	692	1,676	725	1,555	745
São João da Boa Vista .....	6,530	1,237	7,040	1,170	7,070	2,108	7,424	2,175	7,635	2,128
São José do Rio Preto .....	4,450	935	5,620	1,590	4,620	1,529	5,681	2,015	6,025	1,703
Paraíba Valley .....	4,150	901	3,490	775	2,930	733	2,505	590	2,550	740
Others .....	5,530	1,543	5,120	1,760	4,885	1,669	5,114	1,845	5,990	1,822
Total .....	108,670	23,790	123,500	29,195	102,610	29,013	111,585	34,400	118,480	35,168

<sup>1</sup> Preliminary.<sup>2</sup> Boxes of 40 kg. (88.2 lb.).

Source: São Paulo Department of Agriculture

Table 4.—STATE OF SÃO PAULO: Production of citrus

District	1968 <sup>1</sup>						1969					
	Oranges		Tangerines		Lemons-Limes		Oranges <sup>2</sup>		Tangerines <sup>3</sup>		Lemons-Limes <sup>4</sup>	
	Trees	Prod.	Trees	Prod.	Trees	Prod.	Trees	Prod.	Trees	Prod.	Trees	Prod.
	<i>1,000's</i>	<i>1,000 boxes<sup>5</sup></i>	<i>1,000's</i>	<i>1,000 boxes<sup>5</sup></i>	<i>1,000's</i>	<i>1,000 boxes<sup>5</sup></i>	<i>1,000's</i>	<i>1,000 boxes<sup>5</sup></i>	<i>1,000's</i>	<i>1,000 boxes<sup>5</sup></i>	<i>1,000's</i>	<i>1,000 boxes<sup>5</sup></i>
Araçatuba .....	395	673	80	136	54	88	442	645	88	110	50	70
Baurú .....	1,146	1,734	309	632	132	157	1,095	1,658	562	1,000	168	203
Campinas .....	9,534	13,312	1,018	1,324	215	311	11,709	10,862	1,432	1,460	293	214
Grande São Paulo .....	301	467	336	365	202	456	300	495	507	790	301	582
Presidente Prudente .....	280	663	( <sup>6</sup> )	( <sup>6</sup> )	35	100	230	452	106	310	40	48
Ribeirão Preto .....	10,035	13,724	366	712	384	630	13,954	14,633	743	1,100	638	963
São José do Rio Preto .....	2,212	3,075	342	228	188	198	3,533	4,337	250	250	183	169
Sorocaba .....	1,060	1,265	276	342	149	270	1,260	1,365	412	480	220	288
Paraíba Valley .....	472	647	143	231	41	35	307	383	150	230	37	33
Total .....	25,435	35,560	2,870	3,970	1,400	2,245	32,830	34,830	4,250	5,730	1,930	2,570

<sup>1</sup> 1968 bearing trees only.<sup>2</sup> Includes 6,670,000 trees not in bearing.<sup>3</sup> Includes 780,000 trees not in bearing.<sup>4</sup> Includes 500,000 trees not in bearing.<sup>5</sup> Box size: Oranges 40 kg. (88.2 lb.), tangerines 40 kg. (88.2 lb.), lemons and limes 27 kg. (59.5 lb.).<sup>6</sup> Included with oranges.

Source: São Paulo Department of Agriculture



## Size of citrus farms

Practically all the São Paulo farms producing citrus are diversified and devote part of their land to other crops. Many of the farms with less than 20 hectares (about 50 acres) specialize in fruit growing, including other noncitrus fruits such as passion fruit and pineapples. The size of individual holdings devoted mainly to citrus varies considerably, from small farms of 10 hectares (25 acres) or less to one individual holding of more than 1,500 hectares (3,700 acres) in citrus. The latter is probably the largest citrus grove in South America, but there are many other growers with large holdings of over 100,000 citrus trees, as well as a few large company owned and operated groves.

In the important citrus producing county of Bebedouro, there are about 850 rural properties, half of which grow citrus. According to the county tax office (IBRA), the size of the properties with citrus is as follows:

Size of farm	Farms growing citrus
	<i>Percent</i>
10 hectares or less	40
10.1 to 20 hectares	15
20.1 to 40 hectares	20
More than 40 hectares	15

Note: One hectare equals 2.47 acres

It is estimated that there are 4.7 million citrus trees currently in production in this county, with an additional 1- to 1.5-million nonbearing trees.

Most of the citrus farms are owner operated, with very little leased land used for citrus production. Commercial citrus growing by tenant farmers is very unusual. The current value of citrus groves in commercial zones varies considerably, depending upon condition of the grove, soil, location, etc. Good farmland suitable for citrus in the Bebedouro district sells for about \$125 to \$150 an acre, and established groves sell for about \$325 to \$350 an acre. Land prices are about 10 to 20 percent higher in the Araras district, which is much closer to São Paulo and where sugarcane is the major crop. Because of the recent profitability of citrus, land prices have increased in some areas to the point where many farmers are buying land outside the older citrus areas, where prices run as low as \$50 an acre.

## Yields

Irrigation is not widely practiced in the State of São Paulo; hence citrus yields have varied considerably, depending on the amount and distribution of rainfall. Rainfall distribution for the 1967 citrus crop was very favorable, and yields of oranges throughout São Paulo averaged nearly 1.5 boxes (40 kg.) of oranges per tree. This compares with the dry year of 1964, when the orange crop averaged only 0.85 boxes per tree. From the standpoint of rainfall distribution, conditions for the 1969 crop are about the same or slightly worse than in 1964, but average yields are expected to be much better at about 1-1/3 boxes per tree. This apparent sharp improvement in yields is due to the adoption of better cultural practices, including use of more fertilizer, and the coming into production of many young trees, which were affected less by the drought than the older ones.

While statistics on average yields illustrate general changes from year to year, they are not indicative of the yields recorded by the larger commercial growers. Many of these groves are yielding four to seven boxes per tree under normal conditions. This season, because of the severe drought, yields in the same groves have been cut by as much as one-half.

Orange yields are expected to improve on average during the coming seasons for various reasons, the most important of which is the expansion in plantings of new high yielding clones. This planting material, available for several years, is virus free (nucellar lines of the commercial varieties). The Limeira Citrus Experiment Station started to release budwood of citrus nucellar lines in 1955. Although there are no official reports on the extent of their use, it appears from talks with people in the nursery business that these clones account for over 50 percent of the

commercial plantings. Reportedly, yields are two to three times greater than from the old-line stocks under traditional cultural practices.

Yields should also increase because of the increasing use of fertilizer. One large fertilizer company indicates that its sales to citrus producers are up sharply and are expected to increase faster than total sales because of heavier applications and expanded area in citrus.

## **Irrigation**

As indicated earlier, São Paulo citrus zones frequently suffer from very dry conditions. The rainy season generally begins in October and lasts until about April. The driest months are August and September which coincide with the first and second bloom. Although most of the citrus groves rely entirely upon rainfall for moisture needs, except for the watering of young trees after transplanting, the larger farms have installed some irrigation equipment. At the present time none are able to irrigate all of their groves. The most common system of irrigation is overhead sprinklers. Furrow irrigation is seldom practiced as very few of the groves are on land level enough to make it possible. Also, the soils in some areas are so porous that very large quantities of water would be needed to successfully irrigate by furrow or flooding.

No economic studies have yet been published showing the feasibility of irrigation, although those growers who irrigate are convinced it pays to do so. Irrigation equipment purchased in 1968 has in many cases already paid for itself because of the prolonged dry period in that year and most of 1969. Towards the end of the 1969 dry season, distributors of irrigation equipment were unable to fill all their orders. Citrus yields could be improved substantially, especially in dry years, if more groves were irrigated, as illustrated by the results obtained in 1969. On a single farm, the portion of the grove irrigated this season often yielded twice that of the unirrigated section. Another important advantage to irrigation is that it can be used during the period of bloom, which occurs during the dry season.

In most parts of São Paulo there appears to be ample water for irrigation, either from rivers and streams or in the subsoil. The farms now irrigating obtain most of their water from surface sources such as reservoirs, which tend to dry up after constant pumping during a very dry season like 1969, or streams and rivers. Pumping costs using diesel motors are high, and whenever possible, diesel pumps are being replaced with electrically operated pumps.

## **Labor costs**

Farms of less than 10 hectares are usually family-type operations, with much of the labor performed by family members. If the orange crop is sold for processing or export, the picking generally is done by a crew contracted for by the buyer, even on the smaller groves. Most farm workers are paid on the basis of the minimum salary, which in mid-1969 was the equivalent of about \$40 a month. Workers in one crew observed picking in the Araras area reported they were earning \$1.60 per day. Some of the workers are housed with their families on the farm and also work on other crops during part of the year. Worker housing generally is available on farms where citrus is planted on land formerly in coffee. The normal work week is 48 hours or six 8-hour work days.

São Paulo farmers are looking to nearby villages and towns for more and more of their farm labor. It is becoming more common for a farmer to send a truck into town to pick up workers who work on a daily basis. Generally there is little need for itinerant workers, even during picking, as an ample supply of labor usually is available locally or within a 30-mile radius of most farms.

## **Harvesting operations**

The orange harvest in most areas is going on year-round for the fresh market. Picking for processing generally starts with Hamlins in early May and continues until the following December-January with the finishing up of the Valencias. The peak of harvest generally runs from mid-July through September. Harvesting of tangerines for processing begins in April.

All oranges are picked or clipped by hand into picking bags, which then are unloaded into 40-kilo field boxes along the rows for easy pickup by a truck. Oranges for the local market may be packed in the field where some grading and sizing is done, whereas oranges destined for the major domestic markets are normally run through a

packinghouse. All oranges for fresh export are handled in boxes between the groves and the packinghouses. Groves with fruit going to the local and export market usually are picked three to four times, whereas one or two pickings are common with fruit for processing.

When the oranges from an entire grove are sold for processing, which is quite common, the boxes are dumped into the truck and the oranges are bulk hauled from the grove to the juice plant.

## Grower prices

A majority of the commercial growers sell their fruit on the tree, with the buyer responsible for some of the pest-control services and the picking. Buyers representing processors normally start contracting groves in late December and during the early part of the year when the fruit has set. In some instances the crop is sold even earlier, before there is a reasonable indication of eventual yield except crop history. It is not unusual for some firms to have contracted for most of their oranges by the time actual processing is just getting underway.

The method of buying varies, with many growers selling on the basis of so much per box picked during a specified period, but in some cases all the fruit in a grove is sold at an agreed upon price. The buyer usually is responsible for the fruit-fly control program, which involves up to 15 applications of bait for late varieties; he also specifies other pest control measures, normally at his expense.

Once agreement is reached on price, the buyer generally confirms the deal by an exchange of letters. Detailed written contracts are not common. Although some buyers may pay some cash, the general practice is to make a payment of 30 percent on the agreed price in the form of a rural promissory note. The remaining 70 percent is paid at harvesttime when the fruit is delivered. The maturity date of the promissory notes is normally 30 to 90 days, but they can be discounted at a local bank if the grower needs cash. They carry an interest rate of about 1.5 percent a month, which is usually paid by the buyer.

There are no organized price negotiations between producers and buyers, either in the form of producers bargaining organizations or industry buying agreements. There is a great deal of competition among processors to obtain fruit, especially when there is a short crop of processing varieties.

There are no official or industry grades, so practically all the citrus is sold by the growers on a grove-run basis. The São Paulo Department of Agriculture (SPDA) does not publish complete price data for processing fruit, nor is this information readily available from other sources. Growers usually obtain price information from other growers and from buyers. The following price information was gathered from several sources and is given as an indication of what producers in the Araras district received during 1967 and 1968:

Variety	Fruit for processing sold on the tree			
	1967		1968	
	<i>NCr\$/box</i>	<i>US\$/box</i>	<i>NCr\$/box</i>	<i>US\$/box</i>
Hamlin . . . . .	0.70-0.80	0.28	1.00-1.30	0.36
Pera . . . . .	1.40-1.50	0.54	2.00-2.40	0.69
Cravo (tangerine) . . . . .	1.25	0.46	1.30	0.41

Note: Rate of exchange prevailing on April 1 used to convert to dollar equivalent. Box size is 40.8 kg. (89.9 lb.) for oranges and 35 kg. (77.2 lb.) for tangerines.

Preliminary data for 1969 show a sharp increase in growers' prices, with Hamlins averaging about NCr\$3.50 (US\$0.87) a box and Peras NCr\$5.00 (US\$1.25) a box. Trade sources indicated that prices for Peras were as high as NCr\$7.00 to NCr\$8.00 (US\$1.75 to US\$2.00) in September. By this time, however, processors had bought most of their fruit. The SPDA does have a price series showing annual average grower prices for all varieties for both fresh and processing. In 1967 the State's producers averaged NCr\$1.70 a box and for 1968 about NCr\$2.40, which is the equivalent to US\$0.63 and 0.75, respectively, using the April 1 exchange rate. One member of the trade gave a rough estimate of the cost of fruit-fly control, picking, hauling, and buying at 35 to 45 U.S. cents per box.



## Production costs

The SPDA's Agricultural Economics Institute, in a recent study, calculated the average "direct costs" for producing oranges. They are shown in the following tabulation:

Yield per tree	Estimated production costs	
<i>Boxes</i>	<i>NCr\$/box</i>	<i>US\$/box</i>
0.5. ....	7.64	1.91
1.0. ....	4.68	1.17
1.5. ....	3.35	0.84
2.0. ....	2.67	0.67
2.5. ....	2.28	0.57
3.0. ....	2.00	0.50
3.5. ....	1.81	0.45
4.0. ....	1.66	0.42

Source: *Aspet&s Economic&s da Citricultura Paulista*, July 1969.

These average costs are based on a grove where the grower follows the cultural recommendations of the SPDA's extension service and thus are indicative of the more efficiently managed groves where yields are above average. They do not include a return to the farmer for his labor.

Interviews with various members of the Brazilian trade and government suggest that in normal years between 50 and 75 cents per box would adequately cover all costs of production. Because of the lower yields in 1969, however, one source indicated the price would have to be as high as \$1.00 per box to cover direct costs.

## Cost of establishing new orange groves

According to a schedule of costs prepared by the county farm extension office of the SPDA in Araras, a farmer spends nearly US\$80.00 an acre to plant a new orange grove. The total cost is lower for the larger growers because they can supply some of the inputs, such as nursery stock, from their own operation. The nursery stock is the largest single expense, i.e., about 56 percent of the total. These costs are shown in Table 5, which includes the cultural costs through the third year after planting. They are based on a spacing of 7 x 7 meters, with about 81 trees per acre. Other spacings often used are 9 x 6 meters, 8 x 6 meters, and 5 x 6 meters (one meter equals 3.28 feet). The last is quite common in the Limeira zone. Although the trees bear a few oranges in the second year after planting, they usually do not come into commercial production until the fourth year.

## Production outlook

Recently, production has shown no increase, principally because of the very dry weather in 1968 and 1969. Nevertheless, had it not been for the high percentage of newly bearing trees, average yields and thus production in 1969 would have been even lower. Preliminary information indicates the 1970 crop will be about 44.8 million boxes.

Unfortunately there are no published data showing varieties or age of the São Paulo orange trees. From all indications it appears that approximately 10 million trees have been planted during the 4-year period 1966 to 1969 and that most of the new plantings are of the later maturing varieties such as Pera, Natal, and Valencia on the higher yielding nucellar clones. The average yield in São Paulo during years of normal rainfall should increase substantially as these new plantings come into full production and cultural practices continue to improve.

Judging from the orange trees already in production and assuming that 5 million more trees will be planted in both 1969 and 1970, there is a good possibility that São Paulo can produce 63 million to 76 million boxes of oranges by 1975.

Table 5.—Estimated costs of establishing an orange grove in São Paulo in 1969

## Planting costs:

	NCr\$/alqueire <sup>1</sup>	US\$/acre <sup>1</sup>
Land preparation .....	200.00	8.33
Marking contours .....	6.00	.25
Staking tree site .....	15.00	.63
Field Liming - materials .....	100.00	4.17
- applications .....	50.00	2.08
Ant control incl. formicide .....	25.00	1.04
Preparing tree bed .....	110.00	4.58
Planting - labor .....	45.50	1.90
- young trees .....	1,090.00	45.42
Watering .....	93.00	3.88
Fertilizing - material .....	115.00	4.79
- application .....	12.00	.50
Liming of trees - material .....	10.00	.42
- application .....	12.00	.50
Replanting .....	25.00	1.04
<b>Total planting costs .....</b>	<b>1,908.50</b>	<b>79.53</b>
<b>Cultural costs during 1st year:</b>		
Fertilizing - material .....	80.00	3.33
- application .....	36.00	1.50
Field Liming - material .....	100.00	4.17
- application .....	50.00	2.08
Spraying - material and application:		
- Spring vegetation .....	300.00	12.50
- Against mites .....	40.00	1.67
Cultivation .....	375.00	15.63
Hilling around trees .....	68.25	2.84
Removing shoots from root stock .....	10.00	.42
Ant control incl. formicide .....	25.00	1.04
<b>Total 1st year cultural costs .....</b>	<b>1,084.25</b>	<b>45.18</b>
<b>Cultural costs during 2nd year:</b>		
Fertilizing - material .....	130.00	5.42
- application .....	48.00	2.00
Field Liming - material .....	100.00	4.20
- application .....	47.50	1.98
Spraying - materials and application:		
- Spring vegetation .....	350.00	14.58
- Against mites .....	45.00	1.88
Cultivation .....	375.00	15.63
Hilling around trees .....	78.00	3.25
Removing shoots from root stock .....	5.00	.21
Ant control incl. formicide .....	25.00	1.04
<b>Total 2nd year cultural costs .....</b>	<b>1,203.50</b>	<b>50.19</b>
<b>Cultural costs during 3rd year:</b>		
Fertilizing - material .....	250.00	10.42
- application .....	50.00	2.08
Field Liming - material .....	100.00	4.17
- application .....	50.00	2.08
Spraying - materials and application:		
- at flowering and spring vegetation .....	500.00	20.83
- against mites .....	50.00	2.08
Cultivation .....	375.00	15.63
Hilling around trees .....	91.00	3.79
Ant control incl. formicide .....	25.00	1.04
<b>Total 3d year cultural costs .....</b>	<b>1,491.00</b>	<b>62.12</b>

<sup>1</sup> These costs are based on mid-1969 prices and were converted at an exchange rate of NCr\$4.00 equals one US dollar. One alqueire equals 5.98 acres.

Source: Cost schedule prepared by Casa da Lavoura, Araras, São Paulo

Looking at the history of the State, the major factors likely to substantially modify the upward trend in citrus production over the next few years are drought and widespread disease attacks. Nonetheless, it seems apparent that there should be a plentiful supply of oranges in São Paulo during coming seasons.

## PROCESSING OPERATIONS

Brazil's citrus processing industry is located almost entirely in the State of São Paulo. A small plant near Rio de Janeiro, which processes single-strength orange juice for the local market was the only plant known to be operating in another State at the time of this survey. About two-thirds of São Paulo's orange juice output is frozen concentrate, with the remainder hot-pack and preserved concentrate. The extraction of essential oils was the major citrus processing activity until the early 1960's and continues to be of importance along with orange essence, a recent addition to Brazil's product line.

### Number and location of plants

Brazil actually started processing citrus juice for export on a small scale in 1962 with the construction and completion of a small plant at Bebedouro. The following year a modern plant was built at Araraquara, located about 170 miles northwest of São Paulo city. During its first operating season, this plant processed over a million boxes of oranges. The entire output of concentrate was exported to North American and European markets. In 1964 a moderately large plant was built at Matão and in 1965 another one at Bebedouro. During the 3-year period, 1963-65, three smaller plants—two at Bebedouro and one at Barretos—went into operation, and in 1968 another was constructed at Limeira.

The sudden move into citrus processing was brought about by high juice prices in the United States during 1963 as a consequence of the Florida freeze during the winter of 1962-63. Several of the smaller processing firms have run into financial difficulties, with the ownership of plants and machinery changing hands as a result. In some cases processing has ceased. During the 1968 season, six plants reportedly operated. At least one of the smaller plants that operated in 1968 did not process in 1969, and another again appears to be in serious financial trouble. Only the four largest were operating regularly in 1969.

### Size of plants

Enlargement of processing facilities has taken place at some plants since their initial construction. At the present time, the largest plant, with 24 extractors, is located at Matão and the second largest, with 14 extractors, at Araraquara. These neighboring cities are in the center of São Paulo in a citrus area and are about equidistant from the Bebedouro and Limeira zones. There are three plants in Bebedouro, the largest one with 10 extractors, another with six extractors, and the smallest with two extractors. The last generally processes for the domestic market only. The plant at Limeira has two extractors and started operating in 1968; the one at Barretos has not operated since 1966 but will be reopened in 1970. Some of the existing plants plan to install additional extractors in 1970 and several new plants are planned, including a small one in the State of Rio Grande do Sul. The total evaporator capacity of the three largest plants is estimated at 161,000 pounds of water removed per hour. The medium-sized plant has evaporator capacity of 17,000 pounds, and the other plants average about 5,000 pounds.

Most of the buildings are new and were specifically designed for processing citrus. The plant sites are large and generally will permit further adjacent expansion. All of the plants are equipped with their own quality-control laboratories.

It should be pointed out that the plants were built during the period of near runaway inflation, which has now abated somewhat. The cost-of-living increase during 1968 was 24 percent, compared to about 90 percent in 1964 and over 40 percent in both 1965 and 1966. High interest rates continue to prevail, with the current prime rate averaging about 24 percent a year. As great sums of working capital are needed by the companies during the processing season, high interest rates weigh heavily in the real costs of operating the plants.

## Ownership

Foreign investment in the Brazilian citrus processing industry has assumed a more prominent role during the past year. Apparently three of the existing plants have been acquired completely or in part by foreign interests, including the largest facility. Until very recently an American firm was part owner of one of the plants, but it appears that no American companies are directly involved at the present time. None of the existing plants are owned by grower cooperatives, although the majority ownership of one of them is in the hands of a group of citrus growers. A few years ago, a cooperative for processing citrus in Limeira was formed, and now it appears that the Brazilian Government may make a NCr \$2-million loan (about U.S.\$500,000) to the cooperative to start construction of a plant.

The relative strength of the Brazilian citrus processing firms seems to be related directly to their fresh market operations. The owners of the three largest plants are large fresh citrus producers who also operate packinghouses. They pack for both the domestic and the export markets and use the off-grade oranges for processing. In one case culls from a packinghouse are placed on a conveyor belt and sent directly to the adjacent processing plant. One firm also manufactures its own wooden boxes and sells them to other exporters as well. The ability to produce a large quantity of fruit and then have the option of selling it domestically, on the export market, or as a processed product gives these firms a great deal of flexibility.

## Plant equipment and material

Processing operations in Brazil are highly automated. The construction of new plants and the expansion of facilities have generally utilized the latest type of machinery and design. Most of the specialized equipment, including stainless steel pumps, evaporators, and some of the extractors, is made in the United States. Equipment of Brazilian origin also is used by the processors, but in some cases it is manufactured in Brazil by U.S. companies.

All of the containers, from the 55-gallon steel drum to the small consumer-size can used for frozen concentrate on the domestic market are manufactured in Brazil. The small retail cans sold within Brazil are thicker and more expensive than those found in the United States, a problem the processors hope will be solved by the possible construction of a new plant by a major U.S. can manufacturer. Lack of adequate distribution facilities and freezer cabinets often allows the frozen concentrate to thaw and makes the use of the foil-lined laminated container impractical at the present time.

## Labor costs

Wages in citrus processing plants are generally based on the official minimum wage, which is currently about \$40.00 a month. It appears, however, that in some plants very few workers receive that low a salary. Workers with common skills usually receive wages 10 to 25 percent above the minimum, depending upon their specialty. Workers in the plants are mainly men. The labor costs to the employer probably run at least 25 percent above the actual wage paid, owing to payments for health benefits and care, retirement, subsidized meals served at the plant, and other benefits. Nonetheless, labor costs are not high; one of the larger plants estimates that they amount to less than 5 percent of its processing costs.

The availability of unskilled workers is sufficiently large so that the plants generally have no difficulties in filling vacancies. In contrast, there often is a shortage of highly trained technicians and certain skilled workers, which means the pay scales for these jobs are relatively high compared to the minimum wage.

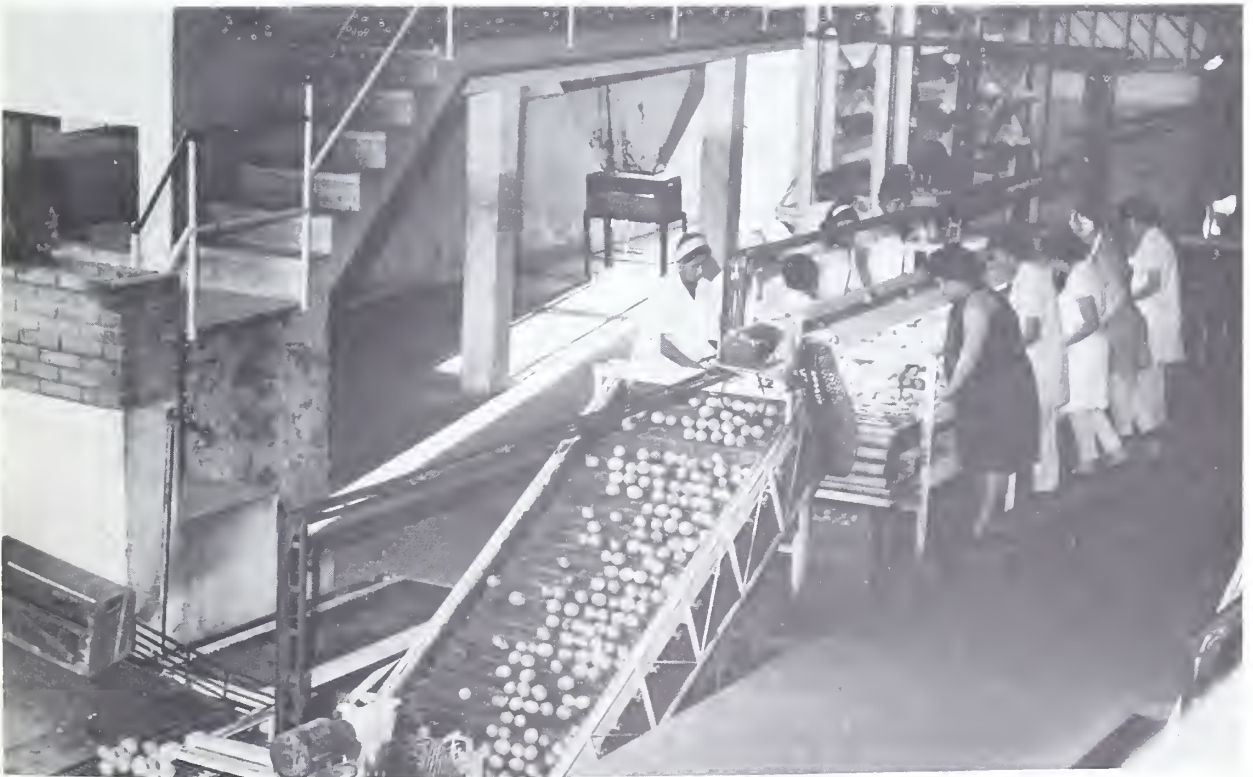
## Orange varieties for processing

The principal orange varieties used for processing are the Pera and the Hamlin. In recent years large plantings of Valencias have been made, and this variety is eagerly sought after by processors. The Natal, a Valencia type, is also a good processing orange but is available in smaller quantities. The Cravo, a tangerine variety, is used by one or two plants to start the processing season early. The juice yield of Peras and Valencias is normally about 50 percent, whereas Hamlins yield slightly less and the Cravo tangerine, about 40 percent (table 6).





Exterior view of a citrus juice plant at Bebedouro in São Paulo.



Oranges are received and graded at the same plant pictured above.

Table 6.—Juice characteristics of specified varieties, Bebedouro and Limeira Zones

Variety and Characteristic	1967 season						1968 season						1969 season					
	Bebedouro			Limeira			Bebedouro			Limeira			Bebedouro			Limeira		
	Fertilized Grove	Nonfertilized Grove	Fertilized Grove	Fertilized Grove	Nonfertilized Grove	Fertilized Grove	Fertilized Grove	Nonfertilized Grove	Fertilized Grove	Fertilized Grove	Nonfertilized Grove	Fertilized Grove	Fertilized Grove	Nonfertilized Grove	Fertilized Grove	Fertilized Grove	Nonfertilized Grove	Fertilized Grove
PERA																		
Brix.....	11.60	12.30	12.20	12.86	12.86	11.79	12.58	12.20	12.20	12.90	13.18	13.90	13.37	13.90	13.37	14.40	14.40	14.40
Acidity....	.82	.96	.95	1.13	1.13	.89	1.00	.98	.98	1.13	1.10	1.26	1.25	1.26	1.25	1.35	1.35	1.35
% Juice ...	52.50	50.50	51.00	48.60	48.60	51.00	50.00	50.00	50.00	48.30	50.00	47.50	49.50	47.50	49.50	46.50	46.50	46.50
VALENCIA																		
Brix.....	11.80	12.32	12.40	12.60	12.60	11.68	12.42	12.20	12.20	12.60	12.67	13.63	13.25	13.63	13.25	13.80	13.80	13.80
Acidity....	.89	1.04	1.01	1.11	1.11	.91	1.10	1.04	1.04	1.15	1.12	1.24	1.21	1.24	1.21	1.34	1.34	1.34
% Juice ...	54.20	53.00	49.50	49.20	49.20	52.40	50.50	49.60	49.60	51.10	51.40	50.40	48.00	50.40	48.00	47.60	47.60	47.60
HAMLIN																		
Brix.....	10.60	11.18	10.68	11.27	11.27	10.88	11.32	10.90	10.90	11.61	11.30	11.53	12.12	11.53	12.12	12.80	12.80	12.80
Acidity....	.77	.87	.88	.95	.95	.82	.90	.88	.88	1.01	.91	.94	.99	.94	.99	1.12	1.12	1.12
% Juice....	48.28	45.20	49.60	48.20	48.20	47.60	47.00	49.20	49.20	47.50	49.30	49.50	47.40	49.50	47.40	46.60	46.60	46.60
CRAVO																		
Brix.....	12.22	12.60	12.71	13.22	13.22	12.03	12.40	12.67	12.67	13.10	13.10	13.82	13.80	13.82	13.80	14.45	14.45	14.45
Acidity....	.96	1.12	1.02	1.26	1.26	.91	.99	1.12	1.12	1.22	1.19	1.28	1.25	1.28	1.25	1.42	1.42	1.42
% Juice ...	39.30	42.20	38.40	41.48	41.48	37.50	42.20	39.50	39.50	40.45	41.50	40.00	38.52	40.00	38.52	37.20	37.20	37.20



Processors pay less for the Hamlin because it is normally low in solids. However, the industry needs this variety as it is the most important early orange for processing. Planting at the present time, especially by individual growers, is heavily oriented to the Pera and Valencia because of the higher average prices. The processors who own their own groves are planting Hamlins in addition to other varieties since they recognize the possibility of a shortage of this early orange in the future.

The Pera matures earlier than the Natal and Valencia, and picking generally begins in June. Peras keep well on the tree and can be left for several months after maturity. Natsals and Valencias require about 12 months to come to maturity after bloom, with heavy picking starting in September and continuing until December and January.

According to trade and government estimates, the processing outlet absorbed 25 to 30 percent of the total orange crop in 1968 and 1969. Although most of this consisted of fruit purchased or produced specifically for processing, packinghouse culls were an important secondary source of supply to some firms. The Pera varieties account for about 75 percent of the oranges used for processing, with Hamlins responsible for between 15 and 20 percent. At the present time, Valencias provide only about 5 percent of the total but are expected to account for a larger share over the next 5 years.

## Citrus products

As indicated earlier, practically all the output of the Brazilian citrus processing industry is orange juice concentrate, mostly in frozen form. A very small quantity of frozen and preserved (SO<sub>2</sub> and sodium benzoate) tangerine and frozen grapefruit juice is produced. Some work on manufacturing lemon juice is currently being conducted by the government but actual production is small. Other products include essential oils and orange essence. The pulp and peel usually are hauled away and are not currently dried and prepared for feed, although one plant has facilities for doing so. A small amount of pulp is used in confectionary products. One of the large processors is constructing a plant in Rio de Janeiro for the preparation of an orange drink, a popular product along the beaches in the area.

Some of the firms have experimented with processing noncitrus fruit, but to date this has not proven successful. São Paulo produces many kinds of tropical fruit, including pineapples, mangoes, and passion fruit, and some members of the industry believe that in the future, plants can be operated processing this type of fruit during the off-season for citrus. The citrus processing season generally begins in late May or June and runs until December or January.

## Production

There are no official or published trade data on the quantity of orange juice concentrate produced. An indication of the total output can be obtained from export data by assuming that carryover from one season to the next is unchanged and taking the July-June shipments as the indicated production, as follows:

Fiscal year	Estimated Brazilian orange juice concentrate production	
	<i>Metric tons</i>	<i>1,000 U.S. gal.<sup>1</sup></i>
1963-64 . . . . .	6,355	1,271
1964-65 . . . . .	5,175	1,035
1965-66 . . . . .	8,425	1,685
1966-67 . . . . .	11,985	2,397
1967-68 . . . . .	21,337	4,267
1968-69 . . . . .	<sup>2</sup> 30,185	<sup>2</sup> 6,037

<sup>1</sup> 1 U.S. gallon = 5 kilos.      <sup>2</sup> Preliminary.

Source: 1963-1966, São Paulo Department of Agriculture;  
1966-1969, CACEX, Bank of Brazil.

This method can only be used for approximating total production, as the smallest plant generally does not export any of its output and some of the larger plants sell a portion of their output on the domestic market. The latter outlet probably accounted for an additional 10 percent in recent years. Another factor which distorts these

production estimates is that not all the plants manufacture orange juice concentrate at the same degree Brix. Most of the production is at 65° Brix, with the exception of one of the larger plants, which produced mostly 58° Brix until the 1969 season when it switched to 65°.

## MARKETING

Most of the frozen orange juice concentrate for export is packaged in steel drums containing 51-53 U.S. gallons. These drums are lined with polyethylene plastic bags, filled with chilled concentrated juice, and then placed in freezers. The drums are transported by truck to the port of Santos, from which practically all of Brazil's frozen concentrate is exported. The trip is at most only 10 hours after loading. The trucks are covered with a double insulated tarpaulin, which generally results in less than a 2-C loss in temperature. At least one of the large processors maintains a freezer-storage warehouse at Santos for holding the drums, if necessary, until loading aboard ship.

Various containers are used for shipping preserved concentrate, including wooden barrels, 55-gallon drums, and 5-gallon cans. Most of the hot-pack concentrate is put up in gallon cans (No. 10 size) but 5-gallon cans are also used. The major markets for these products are West Germany and the United Kingdom. Most of the orange concentrates exported are 65° Brix.

Marketing is somewhat simplified since no significant stocks are carried over from one season to the next. As a result, no working capital is tied up in inventories, and losses from devaluation are minimized. The export season generally runs for 10 months. Sales are made mostly on an f.o.b. basis. Brazil's exchange policy since August 1968 favors regular export movement as now there are mini-devaluations of the cruzeiro several times a year rather than the large yearly or semiyearly devaluations that were made formerly.

Sales are handled individually by each company through its own sales and distribution offices and through wholesalers. There is no national or quasi-State organization or board that sells or promotes citrus products in either the domestic or export markets. Since practically all the Brazilian juice exported loses its national identity once it reaches the market place, no advertising is planned. So far Brazilian juice, according to local processors, has "sold itself."

A large part of the Brazilian concentrate moving into export is tailored to buyers' specifications. Hence, price can vary considerably. For example, one processor claimed his average selling price for frozen orange juice concentrate was \$2.80 per gallon (65° Brix, f.o.b. Santos) in 1968, while another stated he sold a substantial quantity for slightly below \$2.00 and made \$0.35 to \$0.40 per gallon. According to the trade, selling prices early in the 1969 season were about \$3.00-\$3.50 per gallon. As the season progressed, prices declined despite rising raw fruit costs and were quoted at \$2.70-\$3.00 in October. At the time of the survey, some expressed the belief a large Florida crop for 1969-70 would push prices toward the \$2.00 level. However, in December one major exporter reported the current price at nearly \$3.00. A smaller processor reported that his season's average would be about \$2.50.

The domestic market has proven more difficult to develop because of the availability of fresh oranges and other fruit throughout the year, plus competition from other beverages. The reluctance on the part of the people to use orange concentrate and the problems of distribution and storage have thus far severely limited the development of this outlet.

Orange juice for the domestic market is distributed in various sized cans and packages, including a clear polyethylene package. In 1968 a new clear plastic container in the shape of an orange was introduced for fresh juice. It is believed that sales of reconstituted orange juice and orange drinks will be increased substantially thanks to this new package as the end of the processing season coincides with the beginning of the summer months when juice sales are highest.

One major processor in particular is attempting to expand the domestic market through advertising, educational activities, and experimentation with the juice to develop a product acceptable to the consumer's taste. Other manufacturers are also working in this direction, and most feel the buying power in such cities as Rio de Janeiro and São Paulo is sufficient to purchase a far greater amount of juice than at present. Perhaps 10 percent of domestic production is consumed within the country but there is little doubt that this market will expand substantially. With large potential increases in production looming on the horizon, processors do not feel that complete dependence upon the export market is a healthy situation. Another stimulus for selling more juice within the country is that certain taxes paid on materials used for export can be used to offset taxes due on domestic sales.

## GOVERNMENT ASSISTANCE AND CONTROLS

There are no special Federal or State Government programs to develop citrus production or processing in Brazil. The general farm-credit programs benefit citrus growers. This is particularly true of FUNFERTIL, which provides financing for fertilizer and pesticide purchases. For example, FUNFERTIL enables the farmer to pay about 45 days after harvest the cash-price equivalent for fertilizer used before and during the season, with the program subsidizing the carrying costs. The citrus-canker eradication program and the development of virus-free budwood by the SPDA are examples of other types of government assistance to growers. The SPDA's food technology institute (ITAL) located at Campinas does some research on citrus products and has a pilot citrus juice plant.

The Federal Government has various economic development programs that utilize fiscal credits. Individuals and corporations may earmark up to 50 percent of their income tax for use in one or several of these programs. Two of the programs are regional, SUDENE in Northeast Brazil and SUDAM in the Amazon, and benefit agriculture and industry alike. So far there have been no SUDENE or SUDAM projects approved for citrus production. Some citrus is grown in the Northeast, and if any citrus processing plants are constructed in this area, it is highly probable that they will be heavily financed by SUDENE.

Various government financial institutions and programs finance some of the medium- and long-term investment needs of Brazilian food processing firms. It seems likely that the citrus processors have taken advantage of these official sources of capital, especially during the past 2 to 3 years when more funds have been available.

São Paulo is Brazil's major industrial and agricultural state. The State government is making large infrastructure investments, such as expansion of road networks and construction of large hydroelectric projects. Better roads and cheaper power will certainly benefit the food processing industry.

Despite the attention irrigation is currently attracting, there are no specific government projects to develop water resources for the São Paulo citrus zones. In 1968, the Federal Government announced a national irrigation program, the major aspect of which is to provide long-term financing through government financial institutions. The bank of Brazil finances the purchase of irrigation equipment at 14 percent interest with monetary correction, i.e., where the principal is adjusted to compensate for inflation. A team of Israeli technicians studying irrigation possibilities in the Northeast's São Francisco Valley since 1965 has also visited São Paulo and with the SPDA will study irrigation possibilities in the State.

One government program in particular has caused concern, especially among the citrus growers. Reforestation projects approved by the Brazilian Forestry Institute (IBDF) can qualify for financial assistance using the fiscal incentives offered by the Federal Government. The law on reforestation permits the planting of fruit trees. Many fruit producers in São Paulo, their farm associations, and the SPDA are opposed to this part of the reforestation program and have made several attempts to have citrus excluded. Because of this opposition, in mid-1969 the IBDF organized a working committee to study the matter. In mid-December 1969, the Minister of Agriculture decided to exclude planting of citrus under the reforestation program. Two citrus projects were already approved prior to the suspension. The major objections to allowing fiscal credits for citrus, were that plantings had expanded tremendously without direct government incentives, and there is already a great fear of overproduction in a few years from existing citrus groves. Most of the citrus growers could not benefit from the program because of the high costs of preparing a project in relation to the amount of tax credits they would have available for investing in the projects. It was widely believed that corporations and new companies organized specifically for citrus growing would have benefited the most, at the expense of traditional citrus growers who made investments without this type of assistance.

Although there are no direct subsidies, the Brazilian Government, in order to expand exports, offers various tax incentives. The main incentive is the exemption of corporation income taxes on export profits. Other tax benefits include the exemption of the manufacturing tax (IPI) and State value-added taxes (ICM) on exports. A processor can utilize the credits from taxes paid on materials used for export to offset taxes due on domestic sales which are not exempted. São Paulo exempts fresh citrus from the ICM tax, currently 17 percent; this benefits the industry as it lowers raw material acquisition costs.

At the present time, the Brazilian Government exercises little control over the citrus processing industry. A firm may construct a new plant or expand existing facilities without any interference from either the State or Federal Government.



There are no government regulations such as standards of identity or minimum quality requirements at the present time. Usually the buyer has given specifications and in many cases USDA standards are used. There are no government laboratories which check citrus juice products for export. For sales in the domestic market, about the only effective government control is the requirement that the label be registered.

## PROSPECTS

Brazil has already gained the role of a major processor and exporter of orange juice. Judging from the projected increases in the production of oranges largely oriented to the processing outlet, further gains in the export market are likely.

For the foreseeable future perhaps the greatest limitation facing the industry is the expansion in consumption of orange juice and orange juice products in both the domestic and export markets. Some of the major processors believe the next several years will witness a substantial increase in the consumption of orange juice within Brazil. If this potentially large outlet can be developed, less pressure will be placed on an industry that currently depends almost exclusively on the whims of the international market. There is ample room for expanding the citrus processing industry as most of the increased availability of oranges will exceed the anticipated needs of the fresh market for local and export use.

Fresh exports are not expected to grow substantially above current levels except during years when South Africa and the United States are unable to supply the summer market. However, as total production increases, São Paulo should become more competitive on the export market and continue to improve quality by diverting the less desirable fruit to processing.

The many advantages currently enjoyed by Brazil suggest that its processing industry will be a potent factor in the international market, at least in the years immediately ahead. As in the United States and elsewhere throughout the world, however, the future is contingent upon developments both within the country and in world supplies and marketing patterns.



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